

New Reports of Snapping Shrimps, *Alpheus paralcione* and *A. spongiarum* (Decapoda: Caridea: Alpheidae) from Korea

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ABSTRACT

As a result of continuous taxonomic study on shrimps collected from Korean waters, two alpheid shrimps, *Alpheus paralcione* and *A. spongiarum*, are newly reported from Korean waters. These species belong to the *crinitus* group of the genus *Alpheus*. Korean Alpheidae fauna now consists of 18 species of six genera.

Key words: Alpheidae, *Alpheus paralcione*, *A. spongiarum*, Korea

INTRODUCTION

Sixteen species belonging to six genera in the family Alpheidae have been reported in Korea (Kim and Kim, 1997; Miya, 1997; Kim, 1998; Yang, 1999, 2003; Cha et al., 2001; Yang and Anker, 2003; Koo and Kim, 2003a, b). Of these, nine species were reported in the genus *Alpheus*, which is the most diverse group in the family Alpheidae. Seven groups (*macrocheles*, *sulcatus*, *obesomanus*, *crinitus*, *diadema*, *brevirostris*, and *edwardsii*) at present are recognized in the genus *Alpheus* in the world. However, only two groups, *brevirostris* and *edwardsii*, were previously reported in Korea. The continuous taxonomic study on shrimps collected from Korean waters revealed that *Alpheus paralcione* and *A. spongiarum* are new to Korean fauna. These species belong to the *crinitus* group. Korean Alpheidae fauna now consists of 18 species of six

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genera. The specimens were mostly collected by scuba diving at depth of 5-30 m. The abbreviation "cl" refers to carapace length from the tip of rostrum to the posterior dorsal margin of the carapace. Drawings were made with the aid of a camera lucida.

SYSTEMATIC ACCOUNTS

Family Alpheidae Rafinesque, 1815

Genus *Alpheus* Fabricius, 1798

**Alpheus paralcione* Coutière, 1905 (Fig. 1)

Alpheus paralcione Coutière, 1905, p. 895, pls. 80, 81, fig. 34; Miya, 1974, p. 139, pl. 24; Banner and Banner, 1982, p. 113, fig. 30; Chace, 1988, p. 46; Hayashi, 1997, p. 540, figs. 337d, i, 339d, 340d.

Alpheus Providencei Coutière, 1908, p. 208.

Crangon laysani Edmondson, 1925, p. 17, fig. 3.

Material examined. 3♂♂, 1 ovig. ♀, Munseom Is. (Jeju-do), 20 Jan. 1997; 1♂, 2♀♀, 22 Jan. 1997; 1♂, 2 ovig. ♀♀, 1 juv., 11 Nov. 2000; 1♂, 13 Oct. 2002; 2♂♂, 21 Jan. 2003; 1♂, 1 ovig. ♀, Hyeongjeseom (Jeju-do), 21 Aug. 1998; 1 juv., Supseom Is. (Jeju-do), 2 Jul. 1993; 1♂, 1 ovig. ♀, 28 Sep. 1995, 2 ovig. ♀♀, 29 Jul. 1997; 1♀, Beomseom Is. (Jeju-do), 21 Feb. 2001.

Description. Rostrum (Fig. 1A) short, not reaching to distal margin of first antennular segment, and carinate posteriorly. Rostral carina shallow, narrowly rounded dorsally, slightly widened near posterior end and far passing to posterior end of eye.

Ocular hoods slightly inflated dorsally about same level of middle part of rostral carina. Orbitorostral groove shallow but distinct, somewhat flattened anteriorly and not clearly delimited posteriorly. Anterior margin of ocular hood slightly rounded.

First antennular segment with distinct sharp carina (Fig. 1B) extending from ventral inner margin. Second segment slightly longer than visible part of first segment and longer than third segment. Stylocerite broad proximally, sharp at tip and reaching far short of distal margin of first segment.

Scaphocerite more than three times as long as broad. Lateral margin slightly concave. Distal spine directing slightly outward, overreaching distal end of antennular peduncle but not distal end of carpocerite. Inner blade almost as broad as lateral spine, not overreaching distal end of antennular peduncle. Cleft between inner blade and distal spine arising from distal 1/2 of scaphocerite.

Carpocerite overreaching distal end of antennular peduncle by entire length of third antennular segment. Basicerite with narrow sharp lateral spine.

Third maxilliped (Fig. 1C) overreaching distal end of carpocerite by 3/4 length of third segment. Ultimate segment more than two times as long as penultimate and about 3.8 times as long as broad at middle, tip narrowly blunt with long setae on distal margin; tufts of setae on inner surface dense. Penultimate segment broadened with long setae on inferior distal margin. Exopod overreaching distal end of antepenultimate segment.

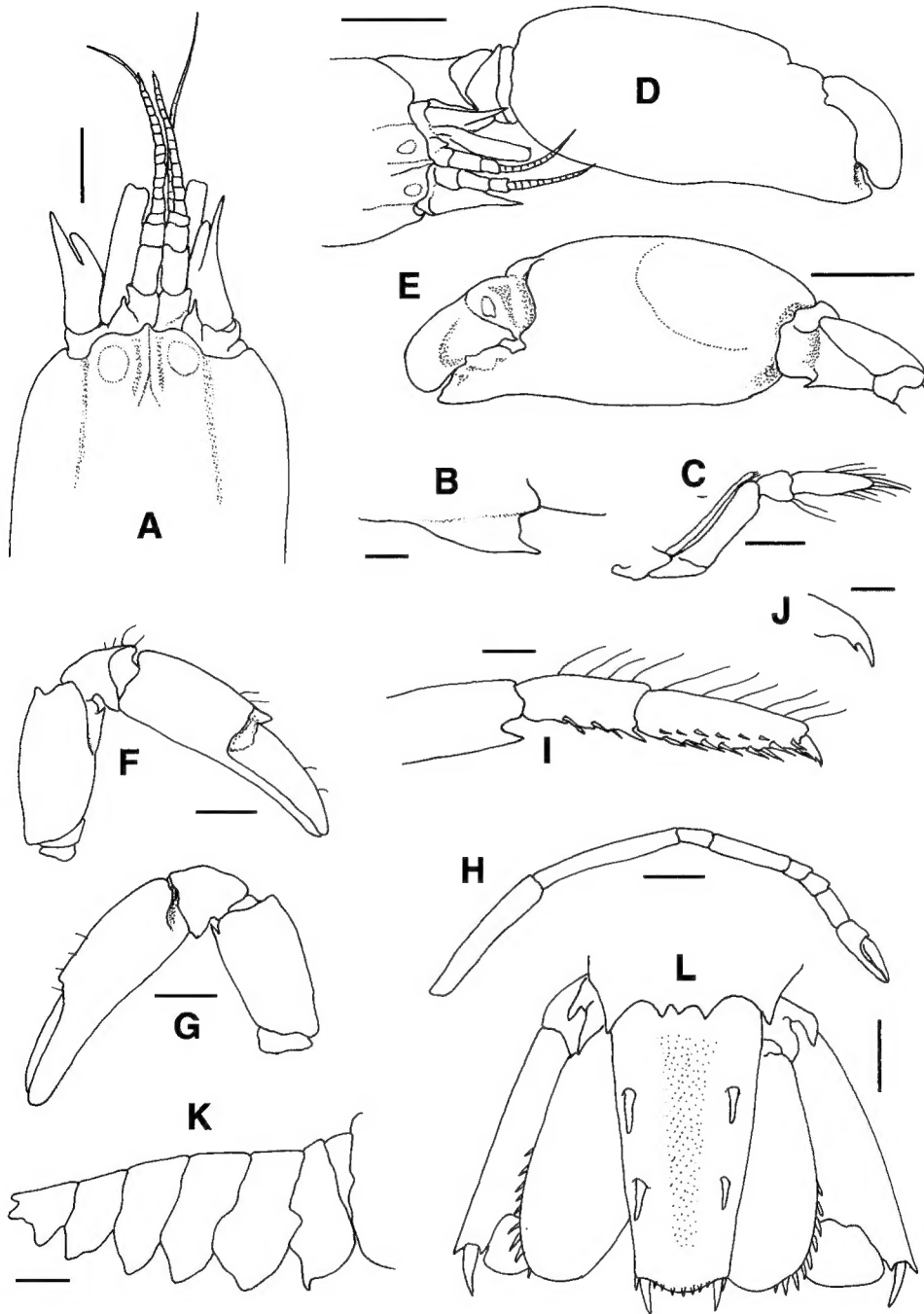


Fig. 1. *Alpheus paralcione*, male, cl 4.3 mm. A, anterior region, dorsal view; B, carina below right first antennular segment; C, right third maxilliped; D, large (left) first pereopod, inner face; E, same, outer face; F, small (right) first pereopod, outer face; G, same, inner face; H, right second pereopod; I, right third pereopod; J, same, dactylus, magnified; K, abdomen; L, telson and uropods. Scale bars = 2 mm (D, E), 1 mm (A, C, F, G, H, K); 0.5 mm (L, I); 0.2 mm (B, J).

Major first pereopod (Fig. 1D, E) overreaching distal end of carpocerite by almost entire length of chela. Major chela broadly oval in cross section, 2.45 times as long as broad. Fingers narrower than palm, occupying less than distal 1/3 of chela. Movable finger regularly arched along superior distal margin, tip bluntly rounded and far overreaching tip of immovable finger. Palm rather plump, without sculpture. Merus small, with inferior inner margin smooth, bearing sharp spine near distal end.

Minor chela of first pereopod (Fig. 1F, G) rather narrow, more than three times as long as broad. Fingers slightly narrower than palm, occupying 1/2 length of chela. Movable finger not balaeniceps in male and female. Merus with inferior inner margin smooth, bearing sharp spine near distal end.

Fingers of chela of second pereopod (Fig. 1H) longer than palm. First segment of carpus slightly less than 1/2 length of second; second segment about 3.8 times as long as third; third segment almost subequal to fourth; fifth segment slightly longer than first segment and about 1.8 times as long as fourth.

Dactylus of third pereopod (Fig. 1I, J) bearing very small tooth on inferior margin, less than 0.3 times as long as propodus. Propodus about 1.33 times as long as carpus, bearing about seven movable spines and six additional small movable spines on inferior margin and pair at distal end. Carpus bearing two movable spines and additional two small movable spines on inferior margin and one immovable spine at distal end. Merus about 3.8 times as long as broad and 2.3 times as long as carpus, bearing large immovable spine on inferior margin near distal end. Ischium with movable spine.

Fourth pereopod almost same as third pereopod. Merus without immovable spine on inferior margin near distal end. Ischium without movable spine.

Fifth pereopod much narrower than third pereopod. Merus with no immovable spine. Ischium with no movable spine.

Pleura (Fig. 1K) of abdominal somites not much overlapping on ventral regions and acute in male, but rounded in female. Sixth abdominal somite tridentate on posterior margin. Appendix masculina much longer than appendix interna.

Telson (Fig. 1L) about 1.9 times as long as broad at anterior end, armed with two pairs of rather stout dorsal spines and with longitudinal median depression on dorsal surface. Lateral margin almost straight. Posterior margin regularly convex, bearing six to seven seta-like spines and armed with pair of strong movable spines at each lateral end; inner spine very strong, more than two times as wide and three times as long as outer one.

Uropodal endopod bearing eight to nine movable spines on distolateral margin. Uropodal exopod with lateral margin ending in acute immovable tooth flanking strong movable spine; spine flanked internally by immovable tooth.

Distribution. Madagascar to Indonesia, Philippines, Japan, Australia, and Pacific Islands to Hawaii; immediate subtidal to 165 meters (Chace, 1988), Korea (Jeju-do).

Remarks. *A. paralcione* shows sexual dimorphism in the shape of pleura of the abdominal somites. Pleura are acute on the ventral margin in male, but rounded in female. Therefore, this dimorphic character is useful for distinction of the sex.

****Alpheus spongiarum* Coutière, 1897 (Fig. 2)**

Alpheus spongiarum Coutière, 1897, p. 236; Miya, 1974, p. 148, pl. 28; Banner and Banner, 1982, p. 116, fig. 31; Chace, 1988, p. 54; Hayashi, 1997, p. 540, figs. 337e, j, 339e, 340e.

Alpheus paraculeipes Coutière, 1905, p. 894, pls. 79, 80, fig. 32.

Material examined. 1♂, 1 ovig. ♀, 1 ind., Beomseom Is. (Jeju-do), 22 Oct. 1991; 2 inds., Munseom Is. (Jeju-do), 30 Jun. 1993; 1♂, 2 inds., 1 Jul. 1993; 1♂, 20 Jan. 1997; 1♂, 1 ovig. ♀, 2 inds., 7 Nov. 2000; 1 ovig. ♀, 13 Oct. 2002; 1 ovig. ♀, Marado Is. (Jeju-do), 4 Nov. 2000; 1♂, 1 ovig. ♀, 6 inds., Geomundo Is. (Jeollanam-do), 15 Oct. 2001.

Description. Rostrum (Fig. 2A, B) very short, not reaching to middle of visible part of first antennular segment, and carinate posteriorly. Rostral carina shallow, narrowly rounded dorsally, slightly widened near posterior end, and far passing to posterior end of eye.

Ocular hoods slightly inflated dorsally above level of middle part of rostral carina. Orbitorostral groove shallow but distinct, not clearly delimited posteriorly. Anterior margin of ocular hood slightly rounded.

First antennular segment with small sharp carina (Fig. 2C) extending from ventral inner margin. Second segment about 1.8 times as long as visible part of first segment and 1.6 times as long as third segment. Stylocerite broad proximally, sharp at tip and not reaching to distal margin of first segment.

Scaphocerite about four times as long as broad. Lateral margin straight to slightly concave at middle. Distal spine directing forward, not overreaching distal end of antennular peduncle. Inner blade vestigial. Cleft between inner blade and distal spine, arising from proximal 1/3 of scaphocerite.

Carpocerite overreaching distal end of antennular peduncle by 1/2 length of third antennular segment. Basicerite without lateral spine.

Third maxilliped overreaching distal end of carpal segment by 1/2 length of ultimate segment. Ultimate segment more than two times as long as penultimate, tip narrowly blunt with long setae on distal margin; tufts of setae on inner surface dense. Penultimate segment little broadened with long setae on inferior distal margin. Exopod overreaching distal end of antepenultimate segment.

Major first pereopod (Fig. 2D) overreaching distal end of carpal segment by almost 9/10 length of chela. Major chela broadly oval in cross section, 2.4 times as long as broad. Fingers much narrower than palm, occupying slightly more than distal 1/3 of chela. Movable finger regularly arched along superior distal margin, tip bluntly rounded and far overreaching tip of immovable finger. Palm rather plump, without sculpture. Merus small, with inferior inner margin smooth, bearing sharp spine near distal end.

Minor chela of first pereopod (Fig. 2E) rather narrow, about three times as long as broad. Fingers slightly narrower and shorter than palm, occupying about 0.4 length of chela. Movable finger not balaeniceps in male and female. Merus with inferior inner margin smooth, bearing sharp spine near distal end.

Fingers of chela of second pereopod (Fig. 2F) longer than palm. First segment of carpus 0.38 times as long as second; second segment about 4.2 times as long as third; third segment almost

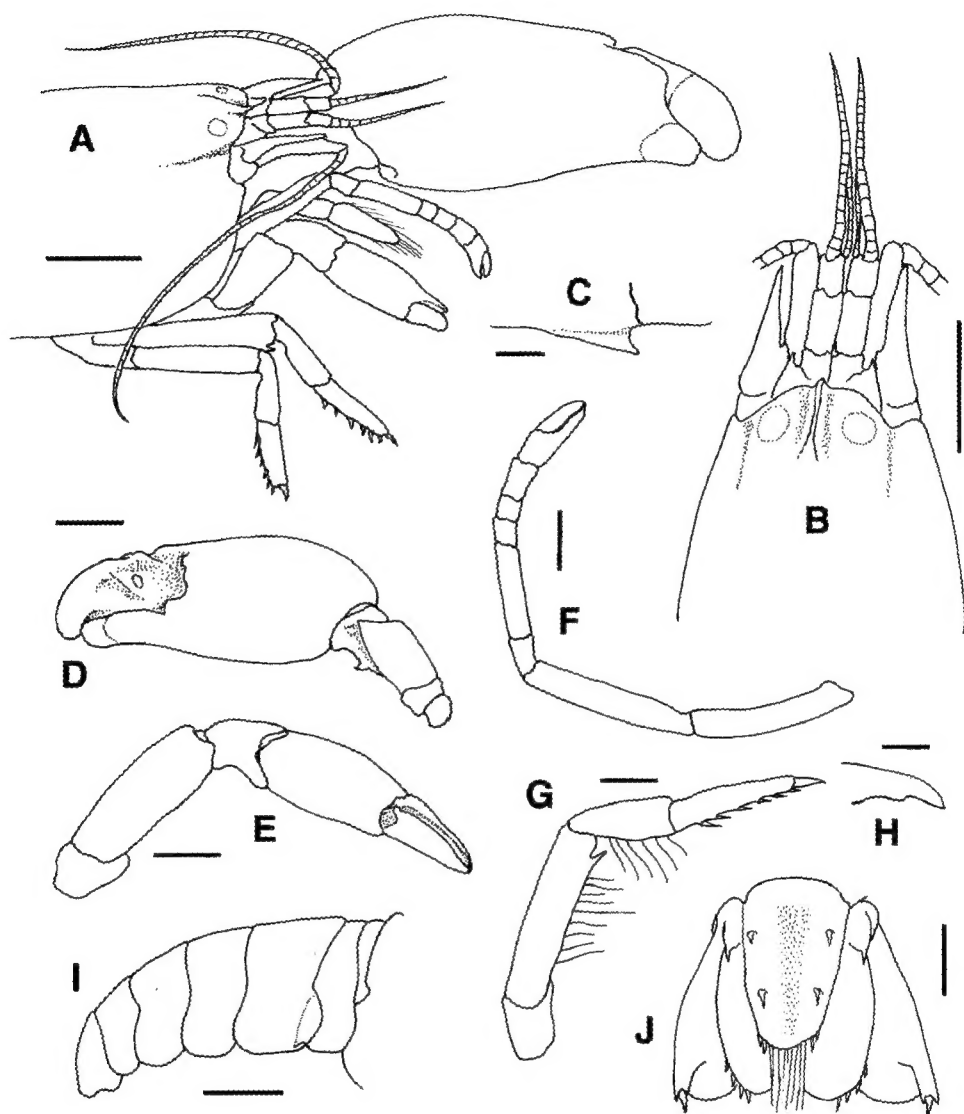


Fig. 2. *Alpheus spongiorum*, male, cl 7 mm. A, anterior region, lateral view; B, same, dorsal view; C, carina below right first antennular segment; D, large (left) first pereopod, outer face; E, small (right) first pereopod, outer view; F, right second pereopod; G, right third pereopod; H, same, dactylus, magnified; I, abdomen; J, telson and uropods. Scale bars = 2 mm (A, B, D, I); 1 mm (E, F, G, J); 0.2 mm (C, H).

subequal to fourth; fifth segment slightly longer than first segment and about 1.7 times as long as fourth.

Dactylus of third pereopod (Fig. 2G, H) simple and conical at tip, with minute hump instead of tooth on inferior margin, and about 1/4 length of propodus. Propodus about 3.3 times as long as carpus, bearing about five movable spines on inferior margin and a pair at distal end. Carpus without movable spines on inferior margin. Merus about 4.1 times as long as broad and 1.9 times

as long as carpus, bearing large immovable spine on inferior margin near distal end. Ischium without movable spine.

Merus of fourth pereopod without immovable spine on inferior margin near distal end. Ischium without movable spine.

Fifth pereopod much narrower than third pereopod. Merus without immovable spine. Ischium without movable spine.

Pleura (Fig. 2I) of abdominal somites rounded on ventral regions in both sexes. Sixth abdominal somite entire on posterior margin. Appendix masculina much longer than appendix interna.

Telson (Fig. 2I) about 1.58 times as long as broad at anterior end, armed with two pairs of rather stout dorsal spines and with longitudinal median depression on dorsal surface. Lateral margin almost straight. Posterior margin regularly convex, armed with a pair of spines at each lateral end; inner spine very strong, more than two times as wide and three times as long as outer one.

Uropodal endopod bearing four to five movable spines on distolateral margin. Uropodal exopod with lateral margin ending in acute immovable tooth flanking strong movable spine; spine flanked internally by immovable tooth.

Distribution. Madagascar, Seychelles, Reunion, Gulf of Aden, Maldives and Laccadive Islands, Sri Lanka, Singapore, Japan, Philippines, Indonesia, and Australia; intertidal to 42 meters, in sponges (Chace, 1988). Korea (Geomundo Is. and Jeju-do).

DISCUSSION

The *crinitus* group is recognized by the following characteristics: ocular teeth absent; rostrum often reduced, at times absent; major chela cylindrical, without grooves or ridges; movable finger of minor chela often balaeniceps in male; third pereopod with merus usually armed, dactylus simple or biunguiculate. *A. paralcione* and *A. spongiarum* show the typical form of the *crinitus* group. These species, however, are easily distinguished by the following characteristics. (1) The posterior margin of the sixth somite is tridentate in *A. paralcione*, but entire in *A. spongiarum*. (2) The carpus of the third pereopod bears one immovable tooth and two to four movable spines on inferior margin in *A. paralcione*, but no such tooth and spines in *A. spongiarum*. (3) The inner blade of the scaphocerite is well developed in *A. paralcione*, but vestigial in *A. spongiarum*. (4) There is a sharp narrow lateral spine on the basiscerite in *A. paralcione* but no lateral spine in *A. spongiarum*.

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REFERENCES

- Banner, D. M. and A. H. Banner, 1982. The alpheid shrimp of Australia. Part III. The remaining alpheids, principally the genus *Alpheus*, and the family Ogyrididae. Rec. Aust. Mus., **34**(1): 1-357, figs. 1-95.
- Cha, H. K., J. U. Lee, C. S. Park, C. I. Baik, S. Y. Hong, J. H. Park, D. W. Lee, Y. M. Choi, K. Hwang, Z. C. Kim, K. H. Choi, H. Sohn, M. H. Sohn, D. H. Kim, and J. H. Choi, 2001. Shrimps of the Korean waters. Nat. Fish. Res. Dev. Inst., Busan, pp. 1-188.
- Chace, F. A., Jr., 1988. The caridean shrimps (Crustacea: Decapoda) of the Albatross Philippine expedition, 1907-1910. Part 5. Family Alpheidae. Smithson. Contrib. Zool., **466**: 1-99.
- Coutière, H., 1897. Note sur quelques alphéidés nouveaux ou peu connus rapportés de Djibouti (Afrique orientale). Bull. Mus. Hist. Nat., **3**(6): 233-236.
- Coutière, H., 1905. Les Alpheidae. In Gardiner, J. S. ed., The Fauna and Geography of the Maldives and Laccadive Archipelagoes, University Press, Cambridge, **2**(4): 852-921, pls. 70-87, text figs. 127-139.
- Coutière, H., 1908. Sur quelques nouvelles espèces d'Alpheidae. Bull. Soc. Philomath. **10**: 191-216.
- Edmondson, C. H., 1925. Crustacea. In Marine Zoology of Tropical Central Pacific. Bernice P. Bull. Bernice P. Bishop Mus. **27**: 3-62, figs. 1-4.
- Hayashi, K. I., 1997. Prawns, shrimps and lobsters from Japan (96). Family Alpheidae-Genus *Alpheus*. Aquabiology, **19**(5): 432-435.
- Kim, H. S. and W. Kim, 1997. Order Decapoda. In The Korean Society of Systematic Zoology, ed., Lists of Animals in Korea (excluding insects). Seoul, pp. 212-223.
- Kim, W., 1998. *Chelomalpheus koreanus*, a new genus and species of snapping shrimp from Korea (Crustacea, Decapoda, Alpheidae). Proc. Biol. Soc. Wash., **111**: 140-145.
- Koo, H. Y. and W. Kim, 2003a. First report of the alpheid *Salmonus gracilipes* (Decapoda: Caridea: Alpheidae) from Korea. Korean J. Syst. Zool., **19**(1): 43-48.
- Koo, H. Y. and W. Kim, 2003b. First report of snapping shrimp *Synalpheus neomeris* (Decapoda: Caridea: Alpheidae) from Korea. Korean J. Syst. Zool., **19**(2): 245-250.
- Miya, Y., 1974. The Alpheidae (Crustacea, Decapoda) of Japan and its adjacent waters. Part II. Publ. Amakusa Mar. Biol. Lab., **3**: 103-195.
- Miya, Y., 1997. *Stenolpheops anacanthus*, new genus, new species (Crustacea, Decapoda, Alpheidae) from the Seto Inland Sea and the Sea of Ariake, South Japan. Bull. Fac. Lib. Arts. Nagasaki Univ. Nat. Sci., **38**: 145-161.
- Yang, H. J., 1999. Larval development of eight species of alpheidoid shrimps (Decapods, Caridea, Alpheoidea) reared in the laboratory. Ph. D. thesis, Pusan National University, Republic of Korea, pp. 1-173.
- Yang, H. J., 2003. Early zoeas of *Athanas japonicus* Kubo, 1936 (Decapoda, Caridea, Alpheidae) reared in the laboratory. Crustaceana, **76**: 443-452.
- Yang, H. J. and A. Anker, 2003. New records of alpheid shrimps (Decapoda, Caridea, Alpheidae) from Korea. Korean J. Syst. Zool., **19**(1): 1-9.

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(십각목: 생이절: 딱충새우과)의 보고

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요 약

새우류의 지속적인 분류학적 연구 결과 딱충새우류 2 종이 한국에서는 지금까지 보고 되지 않은 종으로 밝혀졌다. 원통발딱충새우 (*Alpheus paralcione*)와 해면원통발딱충새우 (*A. spongiarum*)를 재기재하고 한국에서 처음 보고한다. 이 2종은 딱충새우속의 *crinitus* 그룹에 속하며, 한국산 딱충새우류는 6속, 18종으로 구성된다.